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Phytoplankton Data from Frobisher Bay, 1979 to 1981

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by

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ABSTRACT

Hsiao, Stephen I. C. and Nadia Pinkewycz. 1983. Phytoplankton data from Frobisher Bay, 1979 to 1981. Can. Data Rep. Fish. Aquat. Sci. 419: iv + 37 p.

Phytoplankton collections made during the summers of 1979, 1980 and 1981 in Frobisher Bay, in the Canadian arctic, are tabulated quantitatively. A total of 77 species representing 40 genera of phytoplankton occurred in the water column. The Bacillariophyta consisted of 57 species (13 centric and 44 pennate), the Chlorophyta of 7 species, the Pyrrophyta of 6 species, the Chrysophyta of 3 species, the Cryptophyta and the Euglenophyta of 2 species each. Centric diatoms had fewer species but a greater abundance of cells than did the pennate forms.

Key words: Arctic, marine phytoplankton, quantitative species composition, vertical distribution, abundance.

RESUME

Hsiao, Stephen I. C. and Nadia Pinkewycz. 1983. Phytoplankton data from Frobisher Bay, 1979 to 1981. Can. Data Rep. Fish. Aquat. Sci. 419: iv + 37 p.

Des données provenant d'échantillons de phytoplancton recueillis dans la baie de Frobisher au cours des étés 1979, 1980 et 1981 sont présentées sous forme de tableaux quantitatifs. Au total, 77 espèces représentant 40 genres de phytoplancton ont été rencontrées dans la colonne d'eau. Le phytoplancton était regroupé par espèce de la façon suivante: 57 espèces de Bacillariophytes (dont 13 de forme centrique et 44 de forme pennée), 7 espèces de Chlorophytes, 6 espèces de Pyrrophytes, 3 espèces de Chrysophytes et 2 espèces de Cryptophytes et d'Euglénophytes chacun. Les diatomées de forme centrique affichaient un nombre réduit d'espèces bien que l'abondance des cellules ait été comparativement supérieure à celle des diatomées de forme pennée.

INTRODUCTION

Large areas of the eastern Canadian Arctic are being opened to exploration for oil, gas and minerals. For the detection of possible future environmental changes resulting from these developments, data on standing stock, community structure, species composition, and distribution of phytoplankton are of great importance. Little published work is available on the qualitative and quantitative distribution of phytoplankton in this region (Bursa, 1961, 1971; Hsiao, 1979; Hsiao and Trucco, 1980). As part of an arctic marine ecosystem study to obtain data on phytoplankton and environmental parameters, particularly the relationships between the seasonal cycles of these parameters and succession in the phytoplankton assemblage, a baseline study of phytoplankton composition, vertical distribution and abundance was conducted in Frobisher Bay during the open water months of July, August and September in the years 1979, 1980 and 1981. These data provide information for future monitoring of the Frobisher Bay marine ecosystem. They will also be useful for comparison with other arctic regions.

MATERIALS AND METHODS

Phytoplankton samples were collected at intervals of 1-2 weeks at station 1 in Frobisher Bay (Fig. 1) during the summers of 1979, 1980, and 1981. Collections were made with a 5-litre Niskin sampling bottle (model 1010) from the surface, 10 m and the bottom (30-44 m). They were preserved in formalin neutralized with calcium carbonate at a final concentration of 2%. The preserved phytoplankton were quantitatively analyzed for species composition and standing stock. The techniques for preparing permanent slides of cleaned diatoms for species identifications were described by Foy and Hsiao (1976). The species were identified with the aid of a Leitz phase-constrast compound microscope. Standard references for identifications were used and are listed in Hsiao (1979). The cells were enumerated by the method of Hsiao (1979) with the aid of a Leitz inverted microscope.

The data on environmental parameters were reported separately by Lovrity (1981, 1982a, b).

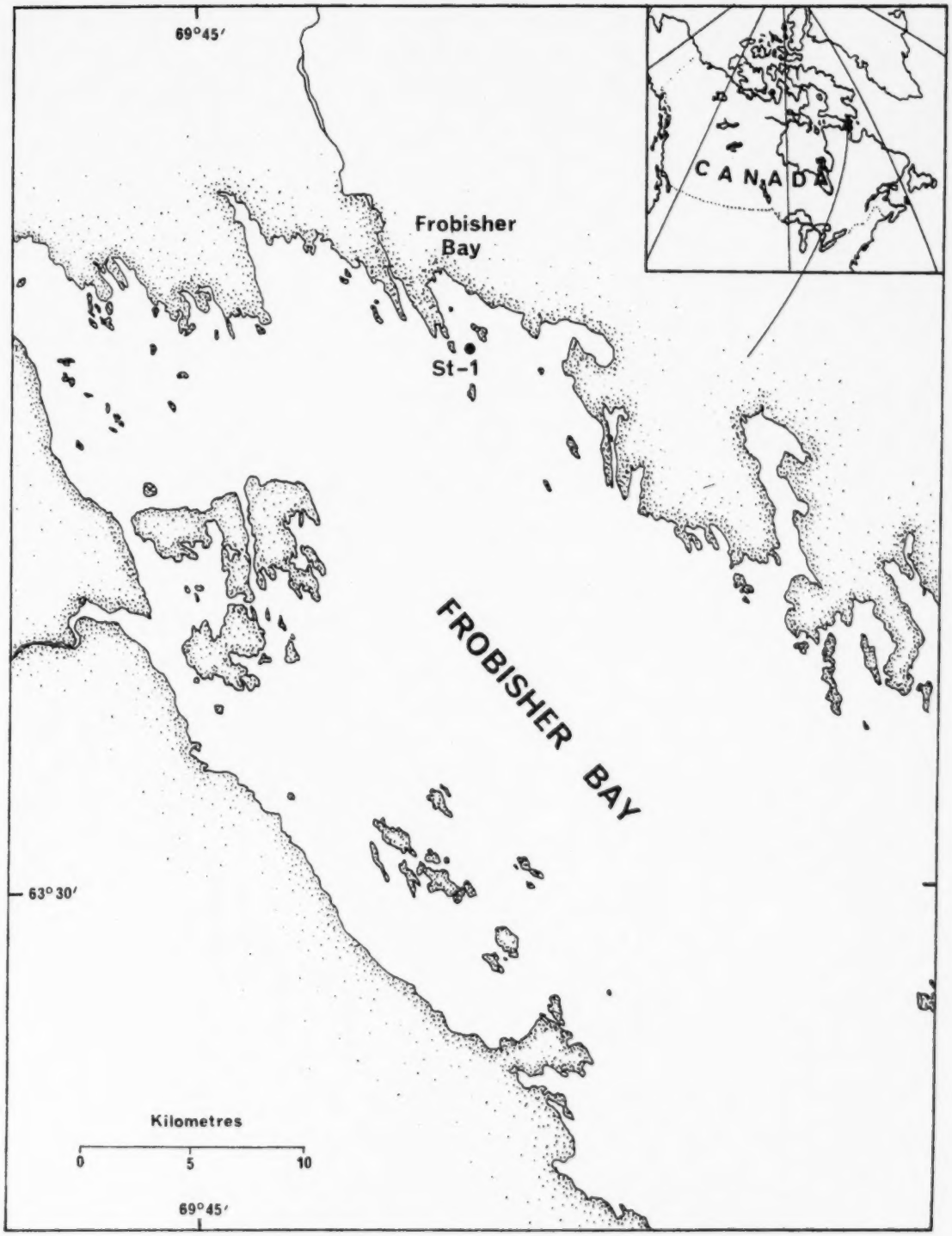

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Table 1. Phytoplankton taxa found in Frobisher Bay during the summers of 1979-1981.

	1979	1980	1981
Bacillariophyta			
Centrales			
Chaetoceros affinis Lauder	X	X	X
C. decipiens Cleve	X	X	X
C. furcellatus Bailey	X	X	X
C. lauderi Ralfs	X	X	
C. septentrionalis Oestrup	X	X	X
C. socialis Lauder		X	X
C. wighami Brightwell	X	X	X
Coscinodiscus lacustris Grunow	X	X	X
Melosira arctica (Ehrenberg) Dickie		X	
Rhizosolenia setigera Brightwell	X		X
Thalassiosira decipiens (Grunow) Joergensen	X	X	X
T. gravida Cleve	X	X	X
T. nordenskioeldii Cleve	X	X	X
Pennales			
Achnanthes lanceolata (Brébisson) Grunow		X	
Amphiprora concilians Cleve	X	X	
A. gigantea var. septentrionalis (Grunow) Cleve	X		
Amphora ovalis (Kützing) Kützing	X	X	X
Asterionella japonica Cleve	X		
Cocconeis californica (Grunow) Grunow	X		
C. costata Gregory	X	X	
C. decipiens Cleve	X		
C. scutellum Ehrenberg	X	X	X
C. scutellum var. parva (Grunow) Cleve	X	X	X
Cylindrotheca closterium (Ehrenberg) Reimann et Lewin	X	X	X
Diploneis bomboides (Schmidt) Cleve			X
D. incurvata (Gregory) Cleve			X
D. smithii (Brébisson) Cleve	X	X	X
Eunotia veneris (Kützing) De Toni		X	
Fragilaria bidens Heiberg	X	X	
F. construens (Ehrenberg) Grunow	X		
F. pinnata Ehrenberg	X		
Gomphonema olivaceum (Lyngbye) Desmazières	X	X	
Grammatophora arctica Cleve	X		
Licmophora dalmatica (Kützing) Grunow	X	X	
Navicula capitata var. hungarica (Grunow) Ross	X		
N. decipiens O'Meara		X	
N. delicatula Cleve	X		
N. directa (Wm. Smith) Ralfs	X	X	X
N. forcipata Greville	X		
N. gelida Grunow	X	X	X
N. granii (E. Joergensen) Gran	X	X	X

Table 1. (Continued)

	1979	1980	1981
N. humerosa Brébisson		X	
N. peregrina (Ehrenberg) Kützing	X	X	X
N. protracta (Grunow) Cleve	X	X	X
N. trigonocephala Cleve	X		
N. valida Cleve et Grunow	X	X	
Nitzschia angustata Grunow	X	X	
N. cylindrus (Grunow) Hasle			X
N. distans Gregory	X		
N. frigida Grunow	X	X	X
N. seriata Cleve	X	X	X
Pinnularia intermedia (Lagerstedt) Cleve	X		
Rhabdonema arcuatum (Lyngbye) Kützing	X	X	X
R. minutum Kützing	X	X	
Synedra tabulata (Agardh) Kützing	X	X	
S. tabulata var. *parva* (Kützing) Hustedt	X		
Tabellaria flocculosa (Roth) Kützing	X	X	X
Thalassionema nitzschioides (Grunow) Van Heurck	X	X	X
Chlorophyta			
Ankistrodesmus falcatus (Corda) Ralfs	X	X	
Carteria cordiformis (Carter) Dill	X	X	X
Chlamydomonas plethora Butcher	X		
C. pulsatilla Wohlenweber	X	X	X
Staurastrum megacanthum Lundell	X	X	
Tetraselmis tetrathele (West) Butcher	X		
Trochiscia multispinosa (Moebius) Lemmermann	X	X	X
Chrysophyta			
Dinobryon balticum (Schuett) Lemmermann	X	X	
Phaeocystis pouchetii (Hariot) Lagerheim	X	X	
Salpingoeca natans Grøntved	X	X	X
Cryptophyta			
Chroomonas placoidea Butcher			X
Hemiselmis rotunda Butcher	X		
Euglenophyta			
Euglena schmitzii Gojdics	X	X	X
E. viridis Ehrenberg	X	X	
Pyrrophyta			
Dinophysis acuminata Claparède et Lachmann	X		
Goniaulax monilata Howell	X	X	X
Peridinium diabolus Cleve	X		X
P. punctulatum Paulsen	X		X
Prorocentrum micans Ehrenberg	X	X	X
P. ovalis Rampi	X	X	X

Table 2. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, July 1, 1979.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	21,700	17,400	6,200
Bacillariophyta	20,700	15,400	5,300
Centrales	2,900	11,400	2,600
Chaetoceros affinis	400	1,100	200
C. decipiens	200	3,000	500
C. furcellatus	800	5,500	1,800
C. septentrionalis	300	--	--
Coscinodiscus lacustris	--	200	--
Thalassiosira decipiens	1,100	1,100	100
T. gravida	--	100	--
T. nordenskioeldii	100	400	--
Pennales	17,800	4,000	2,700
Amphiprora gigantea var. *septentrionalis*	500	--	--
Amphora ovalis	600	100	--
Cocconeis decipiens	300	--	--
C. scutellum	100	--	100
Cylindrotheca closterium	600	1,200	1,100
Diploneis smithii	100	--	--
Fragilaria sp.	200	300	500
F. bidens	700	--	--
F. construens	300	--	--
F. pinnata	100	100	--
Gomphonema olivaceum	200	--	--
Grammatophora arctica	1,700	--	--
Licmophora dalmatica	500	--	--
Navicula capitata var. *hungarica*	400	--	--
N. delicatula	100	--	--
N. directa	200	--	--
N. gelida	800	--	--
N. granii	3,400	1,800	600
N. protracta	1,500	100	100
N. valida	300	--	--
Nitzschia angustata	--	100	--
N. distans	100	--	--
N. frigida	1,800	200	100
N. seriata	300	--	100
Pinnularia sp.	1,200	--	--
P. intermedia	100	--	--
Rhabdonema arcuatum	100	--	--
Synedra tabulata	100	100	--
S. tabulata var. *parva*	500	--	--
Tabellaria flocculosa	900	--	--
Thalassionema nitzschioides	100	--	100

Table 2. (Continued)

Seawater depth (m)	0	10	40
Chlorophyta	800	1,100	700
Carteria cordiformis	100	200	100
Chlamydomonas pulsatilla	300	800	600
Staurastrum megacanthum	300	--	--
Trochiscia multispinosa	100	100	--
Chrysophyta	200	500	--
Dinobryon balticum	100	--	--
Salpingoeca natans	--	100	--
Unidentified	100	400	--
Euglenophyta	--	--	200
Euglena schmitzii	--	--	200
Pyrrophyta	--	400	--
Prorocentrum ovalis	--	400	--

Table 3. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, July 15, 1979.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	15,800	33,200	39,900
Bacillariophyta	13,400	29,600	37,800
Centrales	5,900	21,400	25,300
Chaetoceros affinis	700	5,800	8,500
C. decipiens	1,900	4,200	5,500
C. furcellatus	200	5,100	4,800
C. lauderi	--	--	100
C. septentrionalis	300	200	300
C. wighami	--	400	200
Coscinodiscus lacustris	200	--	--
Thalassiosira decipiens	2,400	4,000	5,100
T. gravida	--	300	300
T. nordenskioeldii	200	1,400	500
Pennales	7,500	8,200	12,500
Amphora ovalis	400	--	200
Cocconeis costata	100	--	--
C. decipiens	100	--	--
C. scutellum	400	--	--
Cylindrotheca closterium	700	4,100	5,900
Fragilaria sp.	200	--	--
Grammatophora arctica	400	--	--
Licmophora dalmatica	100	--	--
Navicula capitata var. *hungarica*	100	--	--
N. gelida	400	--	100
N. granii	2,700	2,400	5,100
N. peregrina	100	400	--
N. protracta	400	--	--
Nitzschia frigida	--	--	200
N. seriata	300	900	600
Pinnularia sp.	400	--	100
Rhabdonema arcuatum	100	--	--
R. minutum	100	--	--
Synedra tabulata	300	--	--
Thalassionema nitzschioides	200	400	300
Chlorophyta	1,300	1,400	1,200
Chlamydomonas pulsatilla	1,100	1,200	1,200
Staurastrum megacanthum	200	--	--
Tetraselmis tetrathele	--	100	--
Unidentified	--	100	--
Chrysophyta	400	200	--
Salpingoeca natans	100	--	--
Unidentified	300	200	--

Table 3. (Continued)

Seawater depth (m)	0	10	40
Euglenophyta	--	1,100	--
Euglena schmitzii	--	1,100	--
Pyrrophyta	700	900	900
Dinophysis acuminata	--	--	100
Goniaulax sp.	200	200	--
G. monilata	--	--	300
Peridinium diabolus	100	100	--
Prorocentrum ovalis	400	400	500
Unidentified	--	200	--

Table 4. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, July 29, 1979.

Seawater depth (m)	0	10	30
Total phytoplankton (cells/litre)	4,000	787,059	22,300
Bacillariophyta	2,800	714,519	19,400
Centrales	1,200	656,487	15,900
Chaetoceros affinis	200	181,350	4,900
C. decipiens	100	181,350	3,900
C. furcellatus	300	228,501	5,000
C. lauderi	--	7,254	--
C. septentrionalis	200	--	--
C. wighami	--	10,881	200
Coscinodiscus lacustris	--	--	200
Thalassiosira decipiens	300	43,524	1,600
T. gravida	--	3,627	100
T. nordenskioeldii	100	--	--
Pennales	1,600	58,032	3,500
Asterionella japonica	300	--	--
Cocconeis californica	--	--	100
C. scutellum	100	--	--
Cylindrotheca closterium	200	3,627	700
Grammatophora arctica	--	--	100
Navicula gelida	300	10,881	200
N. granii	100	29,016	1,800
N. peregrina	--	--	200
Nitzschia frigida	300	--	100
N. seriata	200	10,881	200
Rhabdonema minutum	--	--	100
Synedra tabulata	100	3,627	--
Chlorophyta	500	50,778	1,900
Chlamydomonas pulsatilla	500	50,778	1,700
Trochiscia multispinosa	--	--	200
Chrysophyta	100	3,627	--
Salpingoeca natans	--	3,627	--
Unidentified	100	--	--
Euglenophyta	100	7,254	300
Euglena schmitzii	100	3,627	300
E. viridis	--	3,627	--
Pyrrophyta	500	10,881	700
Goniaulax sp.	--	--	300
G. monilata	--	3,627	--
Peridinium diabolus	300	--	--
P. punctulatum	--	--	200
Prorocentrum micans	100	--	--
P. ovalis	100	7,254	200

Table 5. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 8, 1979.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	6,000	12,600	620,217
Bacillariophyta	3,700	11,500	580,320
Centrales	3,100	10,600	536,796
Chaetoceros affinis	400	2,600	97,929
C. decipiens	600	900	94,302
C. furcellatus	1,500	3,900	268,398
C. septentrionalis	100	300	7,254
C. wighami	--	400	21,762
Thalassiosira decipiens	500	1,600	39,897
T. gravida	--	100	7,254
T. nordenskioeldii	--	800	--
Pennales	600	900	43,524
Cocconeis scutellum var. parva	--	100	--
Cylindrotheca closterium	--	300	14,508
Fragilaria pinnata	100	100	--
Navicula gelida	--	100	--
N. granii	200	200	10,881
N. peregrina	--	--	3,627
N. protracta	--	--	3,627
Nitzschia angustata	--	--	3,627
N. frigida	--	100	--
N. seriata	200	--	3,627
Pinnularia sp.	100	--	--
Rhabdonema minutum	--	--	3,627
Chlorophyta	500	300	18,135
Chlamydomonas pulsatilla	500	300	18,135
Chrysophyta	900	100	3,627
Dinobryon sp.	100	--	--
D. balticum	100	--	--
Salpingoeca natans	400	--	3,627
Unidentified	300	100	--
Euglenophyta	300	500	3,627
Euglena schmitzii	300	300	3,627
E. viridis	--	200	--
Pyrrophyta	600	200	14,508
Goniaulax sp.	--	--	10,881
G. monilata	--	100	--
Peridinium diabolus	300	--	--
P. punctulatum	--	100	--
Prorocentrum micans	100	--	--
P. ovalis	200	--	3,627

Table 6. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 16, 1979.

Seawater depth (m)	0	10	30
Total phytoplankton (cells/litre)	54,100	89,000	23,000
Bacillariophyta	53,500	87,500	21,600
Centrales	53,100	85,800	21,300
Chaetoceros affinis	14,800	12,000	1,500
C. decipiens	8,300	11,200	4,000
C. furcellatus	25,900	55,400	15,200
C. lauderi	200	200	--
C. septentrionalis	900	700	100
C. wighami	2,400	4,400	--
Thalassiosira decipiens	300	1,500	500
T. nordenskioeldii	300	400	--
Pennales	400	1,700	300
Cylindrotheca closterium	--	100	100
Navicula granii	--	1,200	--
N. peregrina	100	--	--
Nitzschia frigida	200	100	200
N. seriata	100	300	--
Chlorophyta	100	200	400
Chlamydomonas pulsatilla	100	200	400
Chrysophyta	100	500	100
Dinobryon sp.	--	100	--
Phaeocystis pouchetii	--	100	--
Salpingoeca natans	100	--	100
Unidentified	--	300	--
Cryptophyta	100	--	--
Hemiselmis rotunda	100	--	--
Euglenophyta	300	400	100
Euglena schmitzii	300	400	100
Pyrrophyta	--	400	800
Peridinium diabolus	--	100	700
Prorocentrum micans	--	100	100
P. ovalis	--	200	--

Table 7. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 24, 1979.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	58,300	81,300	19,300
Bacillariophyta	57,800	78,800	18,700
Centrales	56,500	76,700	18,700
Chaetoceros affinis	8,200	23,800	2,700
C. decipiens	12,300	13,100	2,900
C. furcellatus	29,800	30,900	10,800
C. septentrionalis	500	1,300	200
C. wighami	5,000	6,100	700
Coscinodiscus lacustris	--	--	100
Thalassiosira decipiens	500	1,200	1,300
T. nordenskioeldii	200	300	--
Pennales	1,300	2,100	--
Cocconeis scutellum	100	--	--
Cylindrotheca closterium	--	200	--
Licmophora dalmatica	--	100	--
Navicula gelida	--	100	--
N. granii	800	1,400	--
Nitzschia angustata	100	--	--
N. seriata	300	300	--
Chlorophyta	100	1,000	100
Chlamydomonas plethora	--	400	--
C. pulsatilla	100	600	100
Chrysophyta	100	300	200
Dinobryon sp.	--	200	--
Salpingoeca natans	100	100	200
Euglenophyta	--	200	--
Euglena schmitzii	--	200	--
Pyrrophyta	300	1,000	300
Dinophysis acuminata	--	--	100
Goniaulax sp.	--	500	100
Prorocentrum micans	--	200	100
P. ovalis	300	300	--

Table 8. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, September 1, 1979.

Seawater depth (m)	0	10	35
Total phytoplankton (cells/litre)	21,700	28,800	6,200
Bacillariophyta	21,300	26,800	5,100
Centrales	17,600	26,100	4,700
Chaetoceros affinis	2,400	5,400	200
C. decipiens	2,100	3,800	900
C. furcellatus	10,200	13,400	2,700
C. septentrionalis	--	400	--
C. wighami	800	400	--
Rhizosolenia setigera	--	100	--
Thalassiosira decipiens	2,000	1,700	800
T. gravida	--	100	--
T. nordenskioeldii	100	800	100
Pennales	3,700	700	400
Amphiprora concilians	100	--	--
Cylindrotheca closterium	--	100	300
Navicula gelida	--	--	100
N. granii	1,500	--	--
N. peregrina	--	200	--
N. trigonocephala	100	--	--
Nitzschia frigida	400	400	--
N. seriata	100	--	--
Tabellaria flocculosa	1,500	--	--
Chlorophyta	200	1,100	700
Ankistrodesmus falcatus	--	500	--
Chlamydomonas plethora	--	--	100
C. pulsatilla	200	600	500
Trochiscia multispinosa	--	--	100
Chrysophyta	100	500	--
Dinobryon sp.	--	100	--
Salpingoeca natans	--	100	--
Unidentified	100	300	--
Euglenophyta	--	--	100
Euglena viridis	--	--	100
Pyrrophyta	100	400	300
Goniaulax sp.	--	--	100
G. monilata	--	--	200
Peridinium diabolus	--	200	--
Prorocentrum micans	100	200	--

Table 9. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, September 9, 1979.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	54,800	34,400	12,700
Bacillariophyta	53,300	32,300	11,400
Centrales	51,300	31,800	10,800
Chaetoceros affinis	1,800	3,600	--
C. decipiens	6,700	3,200	1,400
C. furcellatus	21,400	16,700	7,900
C. lauderi	400	--	--
C. septentrionalis	700	--	100
C. socialis	100	100	--
C. wighami	4,300	1,400	--
Thalassiosira decipiens	10,700	6,400	1,300
T. gravida	500	--	100
T. nordenskioeldii	4,700	400	--
Pennales	2,000	500	600
Cocconeis scutellum	--	--	200
Cylindrotheca closterium	100	100	--
Fragilaria pinnata	--	100	100
Navicula forcipata	--	100	--
N. gelida	100	100	100
N. granii	1,000	--	--
N. peregrina	--	100	--
Nitzschia frigida	200	--	200
N. seriata	600	--	--
Chlorophyta	700	900	700
Ankistrodesmus falcatus	200	--	300
Carteria cordiformis	--	100	--
Chlamydomonas plethora	100	400	100
C. pulsatilla	400	400	300
Chrysophyta	400	200	300
Dinobryon balticum	200	--	--
Phaeocystis pouchetii	--	100	100
Salpingoeca natans	200	--	100
Unidentified	--	100	100
Cryptophyta	--	100	--
Hemiselmis rotunda	--	100	--
Euglenophyta	100	200	--
Euglena schmitzii	100	--	--
E. viridis	--	200	--

Table 9. (Continued)

Seawater depth (m)	0	10	40
Pyrrophyta	300	700	300
Dinophysis acuminata	--	100	--
Goniaulax sp.	100	200	--
G. monilata	100	100	--
Peridinium diabolus	--	100	--
Prorocentrum ovalis	100	200	300

Table 10. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, September 22, 1979.

Seawater depth (m)	0	10	44
Total phytoplankton (cells/litre)	6,000	5,500	7,200
Bacillariophyta	5,200	4,200	4,600
Centrales	4,600	3,900	4,000
Chaetoceros affinis	800	400	200
C. decipiens	100	--	--
C. furcellatus	1,200	900	1,200
C. septentrionalis	200	200	100
C. socialis	--	--	200
Coscinodiscus lacustris	--	--	200
Thalassiosira decipiens	1,600	2,200	1,600
T. nordenskioeldii	700	200	500
Pennales	600	300	600
Cocconeis scutellum	--	100	--
Cylindrotheca closterium	100	--	--
Fragilaria pinnata	200	--	--
Navicula granii	--	--	200
N. peregrina	--	--	100
N. protracta	100	--	100
Nitzschia frigida	--	200	--
N. seriata	200	--	100
Synedra tabulata	--	--	100
Chlorophyta	400	700	2,000
Ankistrodesmus falcatus	--	--	1,400
Carteria cordiformis	--	300	--
Chlamydomonas plethora	200	--	--
C. pulsatilla	200	400	600
Chrysophyta	300	300	100
Dinobryon sp.	--	200	--
D. balticum	200	--	--
Phaeocystis pouchetii	--	100	--
Salpingoeca natans	100	--	100
Euglenophyta	100	100	100
Euglena schmitzii	100	100	--
E. viridis	--	--	100
Pyrrophyta	--	200	400
Goniaulax sp.	--	100	--
G. monilata	--	100	--
Prorocentrum micans	--	--	100
P. ovalis	--	--	300

Table 11. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, July 1, 1980.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	18,800	16,800	3,100
Bacillariophyta	13,300	15,000	2,900
Centrales	5,100	10,600	1,700
Chaetoceros affinis	200	2,000	--
C. decipiens	400	3,900	600
C. furcellatus	3,400	3,400	800
C. septentrionalis	100	400	--
C. socialis	100	100	--
Coscinodiscus lacustris	400	100	--
Thalassiosira decipiens	300	500	100
T. nordenskioeldii	200	200	200
Pennales	8,200	4,400	1,200
Achnanthes lanceolata	100	--	--
Amphora ovalis	300	100	--
Cocconeis costata	100	--	--
C. scutellum	--	--	100
Cylindrotheca closterium	400	1,600	300
Diploneis smithii	100	--	--
Fragilaria bidens	100	--	--
Gomphonema olivaceum	200	--	--
Navicula decipiens	--	--	100
N. directa	200	--	--
N. gelida	1,000	--	--
N. granii	2,100	2,100	200
N. peregrina	--	--	100
N. protracta	500	100	--
Nitzschia seriata	1,100	500	100
Pinnularia sp.	900	--	100
Rhabdonema minutum	1,000	--	--
Synedra tabulata	100	--	--
Thalassionema nitzschioides	--	--	200
Chlorophyta	3,900	--	100
Ankistrodesmus falcatus	300	--	--
Carteria cordiformis	200	--	100
Chlamydomonas pulsatilla	3,200	--	--
Staurastrum megacanthum	200	--	--
Chrysophyta	1,300	700	100
Dinobryon sp.	--	300	--
D. balticum	1,300	--	--
Salpingoeca natans	--	200	100
Unidentified	--	200	--

Table 11. (Continued)

Seawater depth (m)	0	10	40
Euglenophyta	--	500	--
Euglena schmitzii	--	500	--
Pyrrophyta	300	600	--
Goniaulax sp.	200	--	--
G. monilata	100	300	--
Prorocentrum micans	--	100	--
P. ovalis	--	200	--

Table 12. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, July 13, 1980.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	37,200	1,157,013	1,048,203
Bacillariophyta	34,000	1,048,203	993,798
Centrales	31,600	787,059	863,226
Chaetoceros affinis	11,700	192,231	253,890
C. decipiens	5,300	181,350	134,199
C. furcellatus	6,300	293,787	398,970
C. septentrionalis	400	21,762	3,627
C. socialis	2,900	--	3,627
C. wighami	--	21,762	14,508
Coscinodiscus lacustris	--	3,627	3,627
Melosira arctica	1,600	--	--
Thalassiosira decipiens	2,100	29,016	21,762
T. gravida	500	18,135	10,881
T. nordenskioeldii	800	25,389	18,135
Pennales	2,400	261,144	130,572
Cylindrotheca closterium	200	10,881	14,508
Eunotia veneris	100	--	--
Licmophora dalmatica	100	--	--
Navicula granii	1,300	235,755	112,437
N. humerosa	100	--	--
N. peregrina	200	3,627	--
N. valida	--	3,627	--
Nitzschia frigida	--	3,627	3,627
Rhabdonema arcuatum	--	3,627	--
Tabellaria flocculosa	100	--	--
Thalassionema nitzschioides	300	--	--
Chlorophyta	1,200	72,540	39,897
Carteria cordiformis	--	43,524	7,254
Chlamydomonas pulsatilla	1,000	29,016	32,643
Trochiscia multispinosa	200	--	--
Chrysophyta	1,600	14,508	7,254
Dinobryon sp.	--	3,627	--
D. balticum	600	--	--
Salpingoeca natans	900	10,881	3,627
Unidentified	100	--	3,627
Euglenophyta	--	3,627	--
Euglena schmitzii	--	3,627	--
Pyrrophyta	400	18,135	7,254
Goniaulax sp.	100	--	3,627
G. monilata	--	18,135	3,627
Peridinium diabolus	200	--	--
Prorocentrum ovalis	100	--	--

Table 13. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, July 25, 1980.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	16,300	23,700	1,069,965
Bacillariophyta	11,100	20,400	986,545
Centrales	8,900	15,500	801,568
Chaetoceros affinis	400	1,600	195,859
C. decipiens	1,200	2,700	170,469
C. furcellatus	400	2,700	290,160
C. lauderi	100	200	3,627
C. septentrionalis	200	100	--
C. wighami	800	100	14,508
Coscinodiscus lacustris	--	--	14,508
Thalassiosira decipiens	4,800	5,700	97,929
T. gravida	--	1,600	--
T. nordenskioeldii	1,000	800	14,508
Pennales	2,200	4,900	184,977
Amphiprora concilians	--	200	--
Amphora ovalis	--	--	7,254
Cocconeis scutellum var. *parva*	--	--	3,627
Cylindrotheca closterium	200	100	14,508
Fragilaria sp.	--	--	3,627
Navicula gelida	100	200	3,627
N. granii	1,100	3,900	105,183
N. peregrina	100	--	--
N. protracta	--	--	3,627
Nitzschia frigida	100	300	43,524
N. seriata	200	--	--
Pinnularia sp.	300	--	--
Synedra tabulata	--	200	--
Thalassionema nitzschioides	100	--	--
Chlorophyta	2,600	1,500	54,405
Carteria cordiformis	300	200	--
Chlamydomonas pulsatilla	2,100	1,000	47,151
Staurastrum megacanthum	200	300	--
Trochiscia multispinosa	--	--	7,254
Chrysophyta	2,000	800	3,627
Dinobryon sp.	100	100	--
Salpingoeca natans	1,100	300	3,627
Unidentified	800	400	--
Euglenophyta	100	--	3,627
Euglena schmitzii	100	--	3,627

Table 13. (Continued)

Seawater depth (m)	0	10	40
Pyrrophyta	500	1,000	21,762
Goniaulax sp.	--	300	--
G. monilata	--	--	7,254
Peridinium diabolus	200	200	--
Prorocentrum micans	--	200	--
P. ovalis	300	300	14,508

Table 14. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 7, 1980.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	12,700	37,400	11,700
Bacillariophyta	11,400	33,800	11,500
Centrales	11,100	33,300	11,100
Chaetoceros affinis	1,200	3,700	4,100
C. decipiens	800	2,600	2,100
C. furcellatus	600	6,300	2,800
C. lauderi	100	--	--
C. septentrionalis	300	300	--
C. wighami	200	1,800	700
Thalassiosira decipiens	5,600	10,900	1,200
T. gravida	700	1,700	--
T. nordenskioeldii	1,600	6,000	200
Pennales	300	500	400
Navicula granii	--	400	200
Nitzschia angustata	--	--	100
N. frigida	200	--	100
N. seriata	100	100	--
Chlorophyta	100	900	100
Carteria cordiformis	--	200	--
Chlamydomonas pulsatilla	100	700	100
Chrysophyta	300	1,200	100
Dinobryon sp.	--	500	--
Salpingoeca natans	100	500	--
Unidentified	200	200	100
Euglenophyta	100	100	--
Euglena schmitzii	100	100	--
Pyrrophyta	800	1,400	--
Goniaulax sp.	100	--	--
G. monilata	100	--	--
Peridinium diabolus	600	900	--
Prorocentrum micans	--	100	--
P. ovalis	--	400	--

Table 15. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 21, 1980.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	2,600	82,700	2,600
Bacillariophyta	1,600	81,000	2,200
Centrales	1,100	79,700	1,900
Chaetoceros affinis	400	10,000	300
C. decipiens	100	5,600	--
C. furcellatus	100	6,000	--
C. lauderi	--	300	--
C. septentrionalis	100	900	--
C. wighami	--	3,500	--
Thalassiosira decipiens	400	36,800	1,500
T. gravida	--	4,700	--
T. nordenskioeldii	--	11,900	100
Pennales	500	1,300	300
Cylindrotheca closterium	400	--	--
Navicula gelida	--	200	--
N. granii	--	300	200
Nitzschia frigida	--	300	--
N. seriata	--	400	100
Pinnularia sp.	--	100	--
Thalassionema nitzschioides	100	--	--
Chlorophyta	500	500	400
Ankistrodesmus falcatus	300	--	--
Carteria cordiformis	--	200	--
Chlamydomonas pulsatilla	100	300	400
Staurastrum megacanthum	100	--	--
Chrysophyta	500	600	--
Dinobryon balticum	500	--	--
Phaeocystis pouchetii	--	100	--
Salpingoeca natans	--	500	--
Pyrrophyta	--	600	--
Goniaulax sp.	--	300	--
Peridinium diabolus	--	200	--
Prorocentrum ovalis	--	100	--

Table 16. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, September 4, 1980.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	3,800	26,100	9,400
Bacillariophyta	2,400	23,700	8,000
Centrales	1,300	23,000	7,800
Chaetoceros affinis	--	1,600	--
C. decipiens	--	600	100
C. furcellatus	300	300	1,900
C. socialis	--	--	200
C. wighami	--	--	200
Thalassiosira decipiens	900	11,600	4,800
T. gravida	--	2,700	500
T. nordenskioeldii	100	6,200	100
Pennales	1,100	700	200
Cylindrotheca closterium	100	--	--
Navicula granii	200	500	--
Nitzschia frigida	100	--	--
N. seriata	600	200	100
Rhabdonema minutum	--	--	100
Thalassionema nitzschioides	100	--	--
Chlorophyta	300	500	900
Carteria cordiformis	200	100	--
Chlamydomonas pulsatilla	100	400	800
Unidentified	--	--	100
Chrysophyta	600	800	100
Dinobryon balticum	100	100	--
Salpingoeca natans	500	600	100
Unidentified	--	100	--
Pyrrophyta	500	1,100	400
Prorocentrum ovalis	500	1,100	400

Table 17. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, September 18, 1980.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	442,494	67,500	10,400
Bacillariophyta	275,652	65,100	8,300
Centrales	250,263	61,000	7,700
Chaetoceros affinis	32,643	7,400	200
C. decipiens	36,270	5,800	400
C. furcellatus	58,032	6,400	500
C. septentrionalis	3,627	200	200
C. wighami	--	1,900	600
Thalassiosira decipiens	112,437	32,000	5,200
T. gravida	--	600	--
T. nordenskioeldii	7,254	6,700	600
Pennales	25,389	4,100	600
Cocconeis scutellum	3,627	--	--
C. scutellum var. *parva*	--	100	--
Cylindrotheca closterium	3,627	100	--
Fragilaria bidens	--	200	--
Licmophora dalmatica	7,254	--	--
Navicula directa	--	100	--
N. gelida	--	100	--
N. granii	--	500	--
N. peregrina	--	--	100
Nitzschia frigida	--	800	--
N. seriata	7,254	2,000	400
Synedra tabulata	--	200	100
Tabellaria flocculosa	3,627	--	--
Chlorophyta	116,064	700	700
Chlamydomonas pulsatilla	116,064	700	700
Chrysophyta	39,897	1,000	1,000
Dinobryon sp.	3,627	--	--
Phaeocystis pouchetii	--	--	100
Salpingoeca natans	36,270	900	900
Unidentified	--	100	--
Euglenophyta	3,627	300	--
Euglena schmitzii	3,627	200	--
E. viridis	--	100	--
Pyrrophyta	7,254	400	400
Goniaulax sp.	3,627	--	--
G. monilata	--	--	200
Prorocentrum ovalis	3,627	400	200

Table 18. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, July 27, 1981.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	9,200	39,200	20,600
Bacillariophyta	8,400	35,700	19,400
Centrales	7,900	27,100	14,000
Chaetoceros affinis	400	4,600	4,400
C. decipiens	100	2,600	2,900
C. furcellatus	1,800	2,100	2,300
C. septentrionalis	100	300	100
C. wighami	200	400	--
Coscinodiscus lacustris	--	400	100
Thalassiosira decipiens	3,100	9,700	3,200
T. nordenskioeldii	2,200	7,000	1,000
Pennales	500	8,600	5,400
Cocconeis scutellum	--	100	--
C. scutellum var. *parva*	--	--	100
Cylindrotheca closterium	200	2,000	300
Diploneis incurvata	--	--	100
Navicula gelida	100	300	200
N. granii	--	4,000	3,300
N. peregrina	--	600	500
Nitzschia cylindrus	--	--	400
N. frigida	100	600	100
N. seriata	--	900	100
Rhabdonema arcuatum	--	100	100
Tabellaria flocculosa	--	--	200
Thalassionema nitzschioides	100	--	--
Chlorophyta	300	2,600	500
Carteria cordiformis	--	100	--
Chlamydomonas pulsatilla	300	2,300	500
Trochiscia multispinosa	--	200	--
Chrysophyta	300	200	200
Salpingoeca natans	100	100	200
Unidentified	200	100	--
Cryptophyta	--	--	300
Chroomonas placoidea	--	--	300
Euglenophyta	--	400	--
Euglena schmitzii	--	400	--
Pyrrophyta	200	300	200
Goniaulax sp.	--	100	100
G. monilata	100	100	100
Prorocentrum micans	100	--	--
P. ovalis	--	100	--

Table 19. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 3, 1981.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	38,800	44,900	29,900
Bacillariophyta	36,700	43,400	27,800
Centrales	35,000	37,600	26,100
Chaetoceros affinis	9,200	8,000	7,900
C. decipiens	7,400	5,900	3,700
C. furcellatus	7,100	10,500	6,800
C. septentrionalis	--	100	--
C. wighami	1,000	2,000	100
Coscinodiscus lacustris	--	--	100
Rhizosolenia setigera	--	--	100
Thalassiosira decipiens	7,200	9,100	5,400
T. gravida	100	--	--
T. nordenskioeldii	3,000	2,000	2,000
Pennales	1,700	5,800	1,700
Amphora ovalis	--	--	100
Cocconeis scutellum var. *parva*	--	100	--
Cylindrotheca closterium	200	100	300
Navicula gelida	300	500	400
N. granii	800	4,500	--
N. peregrina	100	100	100
Nitzschia frigida	--	--	600
N. seriata	300	500	200
Chlorophyta	1,000	1,100	1,900
Carteria cordiformis	200	--	300
Chlamydomonas pulsatilla	800	1,000	1,500
Trochiscia multispinosa	--	100	100
Chrysophyta	600	100	100
Salpingoeca natans	100	100	100
Unidentified	500	--	--
Pyrrophyta	500	300	100
Goniaulax monilata	--	100	--
Peridinium diabolus	200	--	--
P. punctulatum	--	100	--
Prorocentrum micans	300	100	--
P. ovalis	--	--	100

Table 20. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 10, 1981.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	57,000	1,167,894	22,300
Bacillariophyta	56,700	1,149,759	21,900
Centrales	55,900	1,131,624	17,700
Chaetoceros affinis	18,100	366,327	5,900
C. decipiens	11,000	134,199	300
C. furcellatus	13,900	340,938	8,300
C. septentrionalis	1,000	50,778	300
C. wighami	2,500	137,826	200
Coscinodiscus lacustris	--	--	400
Rhizosolenia setigera	--	--	200
Thalassiosira decipiens	7,100	61,659	1,600
T. gravida	700	7,254	100
T. nordenskioeldii	1,600	32,643	400
Pennales	800	18,135	4,200
Amphora ovalis	--	--	200
Cocconeis scutellum	--	--	100
C. scutellum var. *parva*	--	--	100
Cylindrotheca closterium	100	7,254	300
Navicula directa	--	--	100
N. gelida	100	3,627	100
N. granii	--	--	2,200
N. peregrina	--	--	100
Nitzschia frigida	100	3,627	500
N. seriata	500	3,627	500
Chlorophyta	100	7,254	100
Carteria cordiformis	--	--	100
Chlamydomonas pulsatilla	100	7,254	--
Chrysophyta	200	7,254	100
Salpingoeca natans	200	7,254	--
Unidentified	--	--	100
Pyrrophyta	--	3,627	200
Goniaulax monilata	--	--	100
Prorocentrum ovalis	--	3,627	100

Table 21. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 24, 1981.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	21,800	19,800	11,100
Bacillariophyta	21,700	19,700	10,100
Centrales	20,300	18,300	9,000
Chaetoceros affinis	7,500	3,900	2,700
C. decipiens	5,400	3,700	1,700
C. furcellatus	3,400	2,700	2,000
C. septentrionalis	100	300	300
C. wighami	1,000	1,700	200
Thalassiosira decipiens	2,100	5,200	1,700
T. gravida	100	--	--
T. nordenskioeldii	700	800	400
Pennales	1,400	1,400	1,100
Cocconeis scutellum	--	100	--
C. scutellum var. *parva*	100	100	--
Cylindrotheca closterium	--	--	300
Navicula directa	--	--	100
N. gelida	100	100	--
N. granii	200	800	--
N. peregrina	500	200	500
Nitzschia seriata	500	100	200
Chlorophyta	--	100	700
Chlamydomonas pulsatilla	--	100	700
Chrysophyta	--	--	200
Salpingoeca natans	--	--	200
Pyrrophyta	100	--	100
Goniaulax monilata	--	--	100
Prorocentrum ovalis	100	--	--

Table 22. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, August 31, 1981.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	11,700	4,100	3,700
Bacillariophyta	11,700	3,800	3,500
Centrales	11,300	3,500	3,300
Chaetoceros affinis	1,800	800	1,000
C. decipiens	2,700	500	200
C. furcellatus	2,500	300	1,200
C. septentrionalis	--	100	--
C. wighami	600	--	--
Coscinodiscus lacustris	--	100	--
Thalassiosira decipiens	3,000	1,400	700
T. gravida	100	--	--
T. nordenskioeldii	600	300	200
Pennales	400	300	200
Cocconeis scutellum	--	--	100
Diploneis bomboides	100	--	--
Navicula gelida	100	--	--
N. granii	--	200	--
N. peregrina	--	100	--
N. protracta	100	--	--
Nitzschia seriata	100	--	100
Chlorophyta	--	100	200
Carteria cordiformis	--	--	100
Chlamydomonas pulsatilla	--	100	100
Euglenophyta	--	200	--
Euglena schmitzii	--	200	--

Table 23. Quantitative composition and vertical distribution of phytoplankton in Frobisher Bay at station 1, September 7, 1981.

Seawater depth (m)	0	10	40
Total phytoplankton (cells/litre)	12,900	16,600	7,500
Bacillariophyta	12,400	15,900	6,300
Centrales	10,600	15,000	4,600
Chaetoceros affinis	1,400	1,700	900
C. decipiens	900	3,100	600
C. furcellatus	3,700	5,900	2,200
C. septentrionalis	300	500	--
C. socialis	--	--	100
C. wighami	1,500	1,000	200
Thalassiosira decipiens	1,300	2,300	500
T. gravida	600	--	--
T. nordenskioeldii	900	500	100
Pennales	1,800	900	1,700
Amphora ovalis	--	200	--
Cocconeis scutellum	--	--	100
Cylindrotheca closterium	100	100	--
Diploneis smithii	400	--	--
Navicula granii	800	300	1,100
N. peregrina	--	--	200
Nitzschia frigida	100	--	--
N. seriata	300	300	300
Pinnularia sp.	100	--	--
Chlorophyta	300	200	900
Carteria cordiformis	200	--	--
Chlamydomonas pulsatilla	100	200	800
Trochiscia multispinosa	--	--	100
Chrysophyta	100	300	200
Dinobryon sp.	--	--	100
Salpingoeca natans	100	300	100
Euglenophyta	100	--	--
Euglena schmitzii	100	--	--
Pyrrophyta	--	200	100
Goniaulax monilata	--	--	100
Prorocentrum micans	--	100	--
P. ovalis	--	100	--

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